Remarks/Arguments:

Claim 15 has been amended. No new matter is introduced herein. Claims 1-41 are pending.

Claim 15 has been objected to because it includes a typographical error. Claim 15 has been amended accordingly. Applicants respectfully request that the Examiner withdraw the objection to claim 15.

Claims 1, 2, 4-9, 11-16, 18-23 and 25-41 have been rejected under 35 U.S.C. §102(b/e) as being anticipated by Fan *et al.* (US 6,512,866). Applicants respectfully traverse this ground for rejection for the reasons set forth below.

Claim 1 includes features neither disclosed nor suggested by the cited art, namely:

> ...a non-piezoelectric photonic crystal having first and second waveguides separated by a region of the photonic crystal...
>
> ...each of the first and second waveguides having... a coupling length where the first waveguide is proximate to the second waveguide...
>
> ...electrical means or optical means for inducing a change in conductance in the region of the photonic crystal along the coupling length...
>
> ...the switch is configured such that the change in the conductance produces electro-optical switching between the first and second waveguides... (Emphasis Added)

Claims 8, 15, 22, 30, 33, 36 and 39 include similar recitations. As shown in Fig. 1 of the subject specification, a coupled photonic crystal waveguided system includes two closely coupled photonic bandgap (PBG) waveguides 12, 14 separated by two PBG layers along coupling length L_c, such that the first and second waveguides are proximate to each other along the coupling length (p. 6, lines 6-9 of the subject specification). Electrical means or optical means induce a change in conductance in the region of the photonic crystal along coupling length L_c, such that the change in conductance produces electro-optical switching between the first and second waveguides (described, for example, at page 3, lines 12-23; page 6, lines 5-23; and page 11, lines 3-21 of the subject specification).

Fan *et al.* disclose, in Fig. 3, a channel drop filter including photonic crystal 302. Photonic crystal 302 includes two waveguides (bus 304 and drop 306) and resonator system

307. Resonator system 307 includes two point defects 308, 310, where a coupling element between the waveguides is introduced by the defects 308, 310. (Col. 4, line 50-Col. 5, line 2 and Col. 6, lines 9-40 of Fan *et al.*) Fan *et al.*, however, do not disclose or suggest electrical or optical means for inducing a change in conductance in a region of a photonic crystal between first and second waveguides, such that the change in the conductance produces electro-optical switching between the first and second waveguides, as required by claims 1, 8, 15, 22, 30, 33, 36 and 39. Fan *et al.*, instead, teach that switching is produced by the defects 308, 310 of point-defect resonator 307 (Col. 6, lines 7-40).

On page 3, paragraph 4 of the Office Action, the Examiner asserts that the tunable channel drop filter, described at Col. 9, lines 1-17 of Fan *et al.*, is equivalent to electrical/optical means for inducing a change in conductance in a region of the photonic crystal. Applicants respectfully disagree. At Col. 9, lines 1-18, Fan *et al.* describe altering a dielectric constant of the point defect resonator system or its surroundings using electronic, piezo-electric, thermal or electromagnetic mechanisms to change a frequency of the channel (i.e. to drop a different frequency using the same device). Fan *et al.*, however, do not disclose or suggest that these mechanisms produce switching between first and second waveguides. Applicants note that, as described in the subject specification at page 11, lines 18-21, the subject invention differs from the switching device of Fan *et al.* because Fan *et al.* "relies upon a point-defect resonator, or two point defects, situated between two PBG channels." Fan *et al.* are silent on electrical or optical means for inducing a change in conductance to produce electro-optical switching between first and second waveguides. Thus, Fan *et al.* do not include all of the features of claims 1, 8, 15, 22, 30, 33, 36 or 39. Accordingly, allowance of claims 1, 8, 15, 22, 30, 33, 36 and 39 is respectfully requested.

Claim 2, 4-7, 9, 11-14, 16, 18-21, 23, 25-29, 31, 32, 34, 35, 37, 38, 40 and 41 include all of the features of respective claims 1, 8, 15 and 22 from which they depend. Accordingly, these claims are also patentable over the cited art for at least the same reasons as respective claims 1, 8, 15 and 22.

Claims 1-38, 40 and 41 have been rejected under 35 U.S.C. § 102(b/e) as being anticipated by Allan *et al.* (US 2002/0021878). Applicants respectfully traverse this ground for rejection for the reasons set forth below.

Claim 1 includes features neither disclosed nor suggested by the cited art, namely:

> ...a non-piezoelectric photonic crystal having first and second waveguides separated by a region of the photonic crystal...
>
> ...each of the first and second waveguides having... a coupling length where the first waveguide is proximate to the second waveguide...
>
> ...electrical means or optical means for inducing a change in conductance in the region of the photonic crystal along the coupling length...
>
> ...the switch is configured such that the change in the conductance produces electro-optical switching between the first and second waveguides... (Emphasis Added)

Claims 8, 15, 22, 30, 33 and 36 include similar recitations.

Allan *et al.* disclose, in Fig. 14, a planar photonic crystal defect waveguide device including a photonic crystal slab 100 having defect waveguide 102. Photonic crystal slab 100 includes lower clad region 104 and upper clad region 106 that are each a volume of space contiguous with the respective bottom surface and top bottom surface of defect waveguide 102. Lower clad region 104 and upper clad region 106 each encompasses an evanescent tail of an optical signal propagating in defect waveguide 102. (Paragraph [0056]). Allan et al. further disclose that "propagation of an optical signal is controlled by varying an optical property of the lower clad region 104, the upper clad region 106 or both clad regions 104 and 106" (Paragraph [0056]) (emphasis added). Accordingly, Allan *et al.* teach that the evanescent tails of the optical modes that extend into the lower and/or upper clad regions are varied to control propagation of an optical signal.

Allan *et al.* disclose, in Fig. 25, a 2x2 switch using a pair of defect waveguides 170 and 172 in a directional coupler configuration (Paragraph [0064]). In the coupling region, each of controllable regions 173 and 174 of respective defect waveguides 170 and 172 are controlled by an electro-optic polymer slab in contact with the photonic crystal slab 110 (shown in Fig. 17). In paragraph [0064], Allan *et al.* disclose that "controllable regions 173 and 174 may be controlled by an electric field between an electrode above the electro-optic polymer slab and an electrode below the lower clad region to modulate the effective refractive index of the electro-optic polymer" (emphasis added). At paragraph [0064], Allan *et al.* also teach that "defect waveguide 170 is contiguous with a controllable region 173, and the defect waveguide 172 is contiguous with a controllable region 174" (emphasis added). Accordingly, Allan *et al.* again teach that propagation of an optical signal in each individual defect waveguide 170,172 is

controlled by varying the optical properties of each respective lower clad region (to vary the corresponding evanescent tail).

Allan *et al.* do not disclose or suggest a non-piezoelectric photonic crystal having first and second waveguides separated by a region of the photonic crystal, or electrical means or optical means for inducing a change in conductance in the region of the photonic crystal along the coupling length, such that the change in the conductance in the region between the first and second waveguides produces electro-optical switching, as required by claims 1, 8, 15, 22, 30, 33 and 36. The subject invention comprises means for changing the optical properties of the actual defect waveguide region itself. In contrast, Allan *et al.* control the propagation of the optical signal by varying the optical properties of the upper and/or lower clad regions for an individual waveguide and thus change the evanescent tail of the optical modes extending in the upper and/or lower clad regions (See Abstract and paragraph [0056] of Allan *et al.*)

On pages 8-9, paragraphs 9-10 of the Office Action, the Examiner asserts that an electric field as described by Allan *et al.*, "will inherently induce a change in conductance in the region of the photonic crystal that separates the 1st and 2nd waveguides 170 and 172." The Examiner further asserts that the secondary effects meet Applicants claimed limitations. Applicants respectfully disagree. Although Allan *et al.* may inherently induce a change in conductance, Allan *et al.*, do not disclose or suggest that a change in the conductance in a region between the first and second waveguides produces electro-optical switching between the first and second waveguides, as required by claims 1, 8, 15, 22, 30, 33 and 36. Allan *et al.*, instead, teach that the evanescent tails of the optical modes that extend into lower and/or upper clad regions of a photonic crystal slab are varied to control propagation of an optical signal in each individual defect waveguide. Allan *et al.* are silent regarding electrical or optical means for inducing a change in conductance in a region of the photonic crystal such that the change in the conductance produces electro-optical switching between the first and second waveguides, as required by claims 1, 8, 15, 22, 30, 33 and 36. Thus, Allan *et al.* do not include all of the features of claims 1, 8, 15, 22, 30, 33 or 36. Accordingly, allowance of claims 1, 8, 15, 22, 30, 33 and 36 is respectfully requested.

Claims 2-7, 9-14, 16-21, 23-29, 31, 32, 34, 35, 37, 38, 40 and 41 include all the features of respective claims 1, 8, 15 and 22 from which they depend. Accordingly, these

claims are also patentable over the cited art for at least the same reasons as respective claims 1, 8, 15 and 22.

Claims 3, 10, 17 and 24 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Fan *et al.* and further in view of Allan *et al.* These claims, however, include all of the features of respective claims 1, 8, 15 and 22 from which they depend. As discussed above, neither Fan *et al.*, Allan *et al.* nor their combination disclose or suggest electrical or optical means for inducing a change in conductance in a region of the photonic crystal such that the change in the conductance produces electro-optical switching between first and second waveguides, as required by claims 1, 8, 15 and 22. Accordingly, claims 3, 10, 17 and 24, which depend from respective claims 1, 18, 15 and 22, are also patentable over the cited art.

In view of the amendments and arguments set forth above, the above-identified application is in condition for allowance, which action is respectfully requested.

Respectfully submitted,

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I hereby certify that this correspondence is being electronically submitted to the United States Patent and Trademark Office on the date listed below:

/Christine Clarke-Robinson/
Christine Clarke-Robinson

March 6, 2008